

Q: Insulin analogues

- Insulin analogues are modified forms of insulin, created to optimize glycemic control in individuals with diabetes.
- They differ from human insulin in their pharmacokinetic profiles, which affect their onset, peak, and duration of action.

1. Types of Insulin Analogues:

- **Rapid-Acting Analogues:** Such as insulin lispro, insulin aspart, and insulin glulisine.
- **Long-Acting Analogues:** Including insulin glargine, insulin detemir, and insulin degludec.

2. Rapid-Acting Analogues:

- **Onset of Action:** Typically within 15 minutes.
- **Peak Action:** Occurs between 1-2 hours.
- **Duration:** Lasts for about 4-5 hours.
- **Usage:** Taken immediately before or after meals to control postprandial glucose spikes.

3. Long-Acting Analogues:

- **Onset of Action:** Gradual, over several hours.
- **Peak Action:** Most are designed to be peakless to mimic basal insulin secretion.
- **Duration:** Ranges from 18-24 hours (insulin glargine, detemir) to over 42 hours (insulin degludec).
- **Usage:** Provides basal insulin coverage, usually administered once daily.

4. Advantages Over Traditional Human Insulin:

- **Reduced Risk of Hypoglycemia:** Especially nocturnal hypoglycemia.
- **More Predictable Absorption and Action:** Leading to better glycemic control.

- **Flexibility in Timing of Administration:** Particularly with rapid-acting analogues.

5. **Structural Modifications:**

- **Rapid-Acting Analogues:** Modifications near the B26-B30 region of the insulin molecule to prevent dimer and hexamer formation, facilitating rapid absorption.
- **Long-Acting Analogues:** Alterations that increase binding to albumin (insulin detemir) or cause a shift in isoelectric point (insulin glargine), leading to prolonged action.

6. **Clinical Applications:**

- **Type 1 Diabetes:** For basal-bolus therapy, often in combination with a continuous glucose monitoring system.
- **Type 2 Diabetes:** As part of a regimen for patients requiring insulin for optimal glycemic control.

7. **Insulin Pumps and Continuous Glucose Monitoring (CGM):**

- **Compatibility:** Rapid-acting analogues are commonly used in insulin pumps.
- **Integration with CGM:** Allows for more precise dosing and better glucose control.

8. **Safety Profile:**

- **Hypoglycemia:** Still a risk, though lower compared to human insulin.
- **Weight Gain:** Can be a side effect, as with all insulin therapies.
- **Immunogenicity:** Generally low, but antibody formation is possible.

9. **Cost and Accessibility:**

- **Higher Cost:** Insulin analogues are typically more expensive than human insulin.
- **Access Issues:** In some regions, availability and affordability can be a concern.

10. **Future Developments:**

- **Ultra-Long-Acting Analogues:** Further extending the duration of action.

- **Smart Insulins:** Glucose-responsive insulins that activate only in the presence of high glucose levels.
- **Biosimilar Insulins:** To increase accessibility and reduce costs.

Q: Recent advances in insulin therapy

- ❖ Recent advances in insulin therapy reflect a continuous effort to improve diabetes management, particularly focusing on enhancing glycemic control, reducing hypoglycemia risk, and improving patient quality of life
- ❖ The landscape of insulin therapy is rapidly evolving, with advancements aimed at improving the ease of use, reducing the burden of disease management, and minimizing the risk of complications
- ❖ These innovations represent a significant step forward in personalized diabetes care, offering more options tailored to individual patient needs and lifestyles
- ❖ However, access to these advanced therapies can be limited by cost and healthcare infrastructure, highlighting the need for continued efforts in making diabetes care more accessible and equitable globally.

1. Fast-Acting Insulin Analogues

- **Fiasp (Faster-Acting Insulin Aspart):**
 - Contains niacinamide for faster absorption.
 - Begins working in about 2.5 minutes, ideal for post-meal glucose spikes.
- **Lyumjev (Ultra Rapid Lispro):**
 - Rapid onset of action, mimicking natural insulin response more closely.
 - Reduces postprandial glucose excursions.

2. Ultra-Long-Acting Insulin Analogues

- **Tresiba (Insulin Degludec):**
 - Ultra-long duration of action (up to 42 hours), allowing for flexibility in dosing time.
 - Lower risk of nocturnal hypoglycemia.
- **Toujeo (Insulin Glargine U300):**

- Three times the concentration of standard insulin glargine.
- Provides a more stable and prolonged glycemic control.

3. Insulin Pumps and Continuous Glucose Monitoring (CGM) Integration

- **Closed-Loop Systems (Artificial Pancreas):**
 - Combines insulin pump with CGM.
 - Automatically adjusts insulin delivery based on real-time glucose readings.
- **Hybrid Closed-Loop Systems:**
 - Medtronic's MiniMed 670G and 770G.
 - Tandem's t:slim X2 with Control-IQ technology.

4. Inhaled Insulin

- **Afrezza:**
 - Rapid-acting inhaled insulin.
 - Convenient for patients averse to injections.
 - Quick onset and short duration, mimicking prandial insulin spikes.

5. Smart Insulin Pens

- **InPen and NovoPen 6:**
 - Bluetooth-enabled pens that track dosing and timing.
 - Integrate with smartphone apps for dose reminders and glucose monitoring.

6. Concentrated Insulins

- **U-500 Regular Insulin:**
 - For insulin-resistant patients requiring high doses.
 - Reduces the volume of injections.

7. Biosimilar Insulins

- **Basaglar (Biosimilar to Lantus):**
 - Offers a lower-cost alternative to insulin glargine.

- Similar efficacy and safety profile.

8. Oral Insulin

- **Ongoing Research:**

- Developing insulin that can be taken orally.
- Challenges include insulin degradation in the stomach and absorption issues.

9. Glucose-Responsive Insulin

- **Smart Insulin:**

- Still in research phase.
- Designed to activate in response to hyperglycemia and deactivate when normal glucose levels are reached.

10. Gene Therapy

- **Potential Future Development:**

- Gene editing to restore insulin production in pancreatic beta cells.
- Still in early research stages.

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Q: Continuous glucose monitoring

- ❖ Continuous glucose monitoring (CGM) systems represent a significant advancement in diabetes management, offering real-time insights into glucose levels throughout the day and night
- ❖ This technology has revolutionized the approach to both Type 1 and Type 2 diabetes management
- ❖ CGM systems are a cornerstone in modern diabetes management, offering detailed glucose data that can significantly improve patient outcomes
- ❖ They empower patients with real-time feedback, enabling more informed decisions about diet, exercise, and insulin dosing
- ❖ As technology advances, future CGM systems are expected to become more user-friendly, accurate, and integrated with other diabetes management tools, further improving the quality of life for individuals living with diabetes

- ❖ However, addressing issues related to cost and accessibility remains a key challenge to ensure broader benefit from this technology.

Overview

- **Definition:** CGM devices continuously track glucose levels in the interstitial fluid.
- **Components:** Typically include a sensor inserted under the skin, a transmitter, and a receiver or smartphone app.

Key CGM Systems

1. **Dexcom G6:**
 - Factory-calibrated; no fingerstick calibrations required.
 - Real-time glucose readings every 5 minutes.
 - Integrated with insulin pumps and smartphones.
2. **Freestyle Libre:**
 - Flash glucose monitoring system.
 - Sensor worn for up to 14 days.
 - Requires scanning the sensor to get glucose readings.
3. **Medtronic Guardian Connect:**
 - Predictive alerts for hypo- and hyperglycemia.
 - Real-time readings sent to a smartphone app.
 - Integrates with Medtronic insulin pumps.
4. **Senseonics Eversense:**
 - Long-term implantable sensor (up to 90 days).
 - Real-time readings with a removable and rechargeable transmitter.
 - On-body vibe alerts for hypo- and hyperglycemia.

Advantages

- **Improved Glycemic Control:** Continuous data helps in fine-tuning insulin therapy.
- **Hypo- and Hyperglycemia Prevention:** Alerts for rapid glucose changes.

- **Data Trends and Patterns:** Helps in understanding the impact of diet, exercise, and medications.
- **Reduced Need for Fingersticks:** Especially beneficial for patients with needle anxiety.

Challenges and Limitations

- **Cost and Accessibility:** Can be expensive and not always covered by insurance.
- **Sensor Accuracy:** May vary, particularly during rapid glucose changes.
- **Skin Irritation:** Potential for allergic reactions or irritation at the sensor site.
- **Calibration:** Some systems require regular fingerstick calibrations.

Clinical Applications

- **Type 1 Diabetes:** Essential tool for many patients, especially those on insulin pump therapy.
- **Type 2 Diabetes:** Beneficial for patients on intensive insulin regimens or with hypoglycemia unawareness.
- **Gestational Diabetes:** Offers insights into glucose patterns without multiple daily fingersticks.

Integration with Insulin Pumps and Closed-Loop Systems

- **Hybrid Closed-Loop Systems:** CGM data is used to automatically adjust insulin delivery.
- **Improved Time in Range:** CGM integration with insulin pumps has shown to improve time in the target glucose range.

Future Directions

- **Next-Generation Sensors:** Focus on longer wear time, greater accuracy, and reduced calibration needs.
- **Integration with Smart Devices:** Enhanced connectivity with smartphones and smartwatches.
- **Artificial Intelligence:** Utilizing AI to predict glucose trends and provide personalized recommendations.

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Q: Somogyi Phenomenon and Dawn Phenomenon in Type 1 Diabetes

- Both are conditions that cause hyperglycemia in the early morning.
- They are commonly observed in individuals with Type 1 Diabetes.
- Proper differentiation between the two is essential for targeted therapeutic interventions.

Etiology

Somogyi Phenomenon

- Also known as "Rebound Hyperglycemia."
- Primarily a response to low blood sugar during the night.

Dawn Phenomenon

- An endogenous response to hormonal changes in the early morning, notably an increase in growth hormone, cortisol, and catecholamines.

Pathogenesis

Somogyi Phenomenon

- Nocturnal hypoglycemia triggers counter-regulatory hormones (glucagon, cortisol, epinephrine, and growth hormone) to elevate blood glucose levels excessively.
- The liver converts glycogen to glucose, resulting in hyperglycemia upon waking.

Dawn Phenomenon

- Hormones like cortisol and growth hormone peak in the early morning to prepare the body for waking and activity.
- These hormones cause insulin resistance, requiring more insulin to keep blood glucose levels stable, often resulting in hyperglycemia in the morning.

Clinical Manifestations

Somogyi Phenomenon

- Early morning hyperglycemia
- Signs of hypoglycemia at midnight (night sweats, nightmares)
- Variability in fasting morning glucose levels

Dawn Phenomenon

- Consistent early morning hyperglycemia without nocturnal hypoglycemia
- No symptoms of hypoglycemia at midnight

Diagnosis

Somogyi Phenomenon

- Continuous glucose monitoring or frequent glucose checks to identify nocturnal hypoglycemia
- Evaluate response to reduced evening insulin doses

Dawn Phenomenon

- Continuous glucose monitoring showing elevated morning glucose without nocturnal hypoglycemia
- Rule out Somogyi phenomenon via glucose checks at midnight and upon waking

Management

Somogyi Phenomenon

- Reducing evening doses of insulin
- A bedtime snack to prevent nocturnal hypoglycemia
- Switching to longer-acting insulin formulations if using shorter-acting insulin

Dawn Phenomenon

- Shifting the timing of insulin administration to better match the dawn rise in glucose
- Using an insulin pump to adjust the insulin delivery rate in the early morning
- Adjusting basal insulin dosages

Clinical Relevance

- Correct diagnosis and differentiation between the two phenomena are crucial for appropriate treatment adjustments.
- Failure to differentiate may result in therapeutic mismanagement, causing recurrent episodes of hypoglycemia or persistent hyperglycemia.

Somogyi Phenomenon vs Dawn Phenomenon in Type 1 Diabetes

Parameter	Somogyi Phenomenon	Dawn Phenomenon
Introduction	Causes morning hyperglycemia due to nocturnal hypoglycemia	Causes morning hyperglycemia due to hormonal changes
Etiology	Response to low blood sugar	Hormonal changes (growth hormone, cortisol)
Pathogenesis	Counter-regulatory hormones elevate glucose levels	Hormones cause insulin resistance leading to elevated morning glucose
Clinical Manifestations	Early morning hyperglycemia Signs of midnight hypoglycemia (night sweats, nightmares)	Consistent early morning hyperglycemia No midnight hypoglycemia
Diagnosis	Continuous glucose monitoring Midnight glucose checks Reduced evening insulin dosage test	Continuous glucose monitoring Absence of midnight hypoglycemia
Management	Reduce evening insulin dose Bedtime snack Longer-acting insulin	Shift timing of insulin administration Adjust basal insulin Insulin pump for precise control
Clinical Relevance	Requires accurate diagnosis for treatment adjustments to prevent nocturnal hypoglycemia	Requires differentiation from Somogyi for appropriate insulin adjustments

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Q: Commonly Used Insulin Regimens for Long-Term Treatment of Type 1 Diabetes Mellitus (DM) Management of treatment of diabetes at home

- ✚ Long-term management of Type 1 DM requires a comprehensive approach that includes various insulin regimens tailored to individual needs.
- ✚ The choice of insulin regimen depends on various factors including lifestyle, age, and individual preferences.

- ✚ Home management is an integral part of long-term treatment, requiring patient education and regular monitoring.
- ✚ Home management is crucial for maintaining glycemic control and preventing complications.

Basal-Bolus Regimen

- **Basal Insulin**
 - Glargine (Lantus), Detemir (Levemir)
 - Dose: 0.1-0.2 U/kg, once daily
- **Bolus Insulin**
 - Aspart (NovoLog), Lispro (Humalog)
 - Dose: 0.1 U/kg before meals
- **Home Management**
 - Self-monitoring of blood glucose (SMBG) before meals and at bedtime.
 - Adjust bolus insulin based on carbohydrate intake and physical activity.

Multiple Daily Injections (MDI)

- **Intermediate-Acting Insulin**
 - NPH (Humulin N, Novolin N)
 - Dose: 0.2-0.4 U/kg, twice daily
- **Rapid-Acting Insulin**
 - Aspart, Lispro
 - Dose: 0.1 U/kg before meals
- **Home Management**
 - SMBG at least four times a day.
 - Insulin adjustments based on SMBG and planned activities.

Continuous Subcutaneous Insulin Infusion (CSII)

- **Insulin Pump**
 - Delivers rapid-acting insulin continuously

- **Dose**
 - Basal rate and bolus doses are programmable
- **Home Management**
 - Frequent SMBG or continuous glucose monitoring (CGM)
 - Regular calibration of the insulin pump

Pre-Mixed Insulin

- **70/30, 50/50 or 75/25 formulations**
 - Combinations of intermediate and rapid-acting insulins
- **Dose**
 - Varies based on individual needs, usually twice daily
- **Home Management**
 - SMBG before meals and at bedtime
 - Less flexibility in dose adjustments

Home Management Strategies Common to All Regimens

- **SMBG or CGM**
 - Regular monitoring to guide insulin adjustments
- **Carbohydrate Counting**
 - To calculate mealtime insulin doses
- **Physical Activity**
 - Adjust insulin doses to prevent hypoglycemia during and after exercise
- **Sick Day Management**
 - Increased monitoring and possible insulin adjustments
- **Telemedicine**
 - Remote consultations for fine-tuning therapy and addressing concerns

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Q: Diagnosis and Complications of Metabolic Syndrome in Pediatric Patients

Diagnostic Criteria

- **Abdominal Obesity**
 - Waist circumference >90th percentile for age and sex.
- **Hypertriglyceridemia**
 - Triglyceride levels >150 mg/dL or specific treatment for this lipid abnormality.
- **Low HDL Cholesterol**
 - HDL cholesterol <40 mg/dL or specific treatment for this lipid abnormality.
- **High Blood Pressure**
 - Systolic BP >130 mm Hg or diastolic BP >85 mm Hg or treatment of previously diagnosed hypertension.
- **Hyperglycemia**
 - Fasting glucose >100 mg/dL or previously diagnosed type 2 diabetes.

Diagnostic Tools

- **Anthropometric Measurements**
 - Waist circumference, BMI.
- **Blood Tests**
 - Lipid profile, fasting glucose, insulin levels.
- **Blood Pressure Monitoring**
 - Multiple readings to confirm hypertension.

Complications

Cardiovascular Complications

- **Atherosclerosis**
 - Early onset and rapid progression.
- **Hypertension**

- Increased risk of developing chronic hypertension.
- **Coronary Artery Disease**
 - Elevated risk in adulthood.

Endocrine Complications

- **Insulin Resistance**
 - Precursor to type 2 diabetes.
- **Polycystic Ovary Syndrome (PCOS)**
 - In adolescent females, associated with insulin resistance.

Hepatic Complications

- **Non-Alcoholic Fatty Liver Disease (NAFLD)**
 - Increased prevalence in children with metabolic syndrome.
- **Hepatic Steatosis**
 - Accumulation of fat in the liver, leading to liver dysfunction.

Renal Complications

- **Chronic Kidney Disease**
 - Long-term risk due to hypertension and insulin resistance.
- **Microalbuminuria**
 - Early sign of renal dysfunction.

Psychological Complications

- **Depression and Anxiety**
 - Increased prevalence due to chronic illness and lifestyle limitations.
- **Body Image Issues**
 - Especially in adolescents, leading to eating disorders.

Other Complications

- **Sleep Apnea**
 - Increased risk due to obesity.
- **Increased Inflammatory Markers**

- Elevated levels of CRP, IL-6, indicative of chronic inflammation.

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Q: Hormones in Various Systems and Their Significance and Functions

Note: this discussion excludes pituitary, thyroid, adrenal, gonadal systems

Gastrointestinal System

Hormone	Significance & Functions
Gastrin	Stimulates gastric acid secretion, enhances gastric motility
Secretin	Stimulates pancreatic bicarbonate secretion, inhibits gastric acid secretion
Cholecystokinin	Stimulates gallbladder contraction, pancreatic enzyme secretion, and delays gastric emptying
Ghrelin	Stimulates appetite, promotes fat storage
Motilin	Regulates gastrointestinal motility
Somatostatin	Inhibits the release of many hormones in the digestive system

Respiratory System

Hormone	Significance & Functions
Prostaglandins	Modulate inflammation and bronchoconstriction
Leukotrienes	Involved in bronchoconstriction and inflammatory responses
Epinephrine	Bronchodilation, increases respiratory rate

Cardiovascular System

Hormone	Significance & Functions
Angiotensin II	Vasoconstriction, stimulates aldosterone secretion
Atrial Natriuretic Peptide (ANP)	Vasodilation, inhibits renin and aldosterone, promotes diuresis

Brain Natriuretic Peptide (BNP)	Similar to ANP, used as a marker for heart failure
Endothelins	Potent vasoconstrictors
Adrenomedullin	Vasodilation, diuretic effect

Renal System

Hormone	Significance & Functions
Aldosterone	Promotes sodium retention, potassium excretion
Antidiuretic Hormone (ADH)	Promotes water reabsorption, vasoconstriction
Renin	Converts angiotensinogen to angiotensin I, part of the renin-angiotensin-aldosterone system
Erythropoietin	Stimulates red blood cell production
Prostaglandins	Modulate renal blood flow, glomerular filtration rate

Q: Diagnosis and management of hyper-insulinemic hypoglycemia beyond neonatal period.

- ❖ Diagnosis and management of hyperinsulinemic hypoglycemia (HH) beyond the neonatal period involve a multi-step approach, considering the wide range of potential causes and the need for precise treatment to prevent hypoglycemic brain injury
- ❖ Management of HH beyond the neonatal period requires a careful balance between preventing hypoglycemia and avoiding overtreatment
- ❖ It involves a combination of medical, dietary, and possibly surgical interventions, tailored to the individual patient's needs
- ❖ Regular follow-up and family education are crucial components of care.

Diagnosis of Hyperinsulinemic Hypoglycemia

1. Clinical Presentation:

- Recurrent episodes of hypoglycemia, especially postprandial or during fasting.
- Symptoms: Sweating, tremors, lethargy, seizures, or coma in severe cases.

2. **Biochemical Evaluation:**

- **Blood Glucose Levels:** Document hypoglycemia (<70 mg/dL).
- **Critical Sample:** Taken during hypoglycemia for insulin, C-peptide, proinsulin, beta-hydroxybutyrate, free fatty acids, and glucose.

3. **Insulin Levels:**

- Inappropriately high or normal insulin levels during hypoglycemia.
- C-peptide and proinsulin levels also elevated, indicating endogenous insulin production.

4. **Exclusion of Other Causes:**

- Rule out other causes of hypoglycemia: ketotic hypoglycemia, adrenal insufficiency, liver disease, etc.

5. **Imaging Studies:**

- **Pancreatic Imaging:** Ultrasound, CT, or MRI to identify focal lesions.
- **PET Scan:** May be used in some cases to localize focal lesions.

6. **Genetic Testing:**

- Screen for mutations in genes associated with congenital hyperinsulinism (e.g., ABCC8, KCNJ11).

7. **Differential Diagnosis:**

- Distinguish between focal and diffuse disease, which has implications for management.

Management of Hyperinsulinemic Hypoglycemia

1. **Acute Management:**

- **Glucose Infusion:** To maintain blood glucose levels.
- **Glucagon:** Emergency treatment for severe hypoglycemia.

2. **Chronic Management:**

- **Dietary Modifications:** Frequent, carbohydrate-rich meals.
- **Medications:**
 - **Diazoxide:** Opens potassium channels in beta cells, inhibiting insulin release.

- **Octreotide:** Somatostatin analogue that suppresses insulin secretion. Depot preparations available for 4 weekly administration.
- **Sirolimus** – immunomodulator with serious adverse effects does achieve some benefit.

- **Monitoring:** Regular blood glucose monitoring.

3. **Surgical Intervention:**

- Indicated in focal hyperinsulinism or if medical management fails.
- Partial pancreatectomy for focal lesions.
- Near-total pancreatectomy for diffuse disease, with risk of diabetes mellitus.

4. **Management of Complications:**

- Monitor for and manage hypoglycemic brain injury.
- In cases of pancreatectomy, monitor for diabetes and exocrine pancreatic insufficiency.

5. **Long-term Follow-up:**

- Regular monitoring of growth, development, and glycemic control.
- Adjustments in therapy based on response and side effects.

6. **Family Education and Support:**

- Educate about disease, emergency management of hypoglycemia.
- Psychological support for families dealing with chronic illness.

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Q: Management of an adolescent girl with polycystic ovarian syndrome

Management of an adolescent girl with Polycystic Ovarian Syndrome (PCOS) is multifaceted, involving lifestyle modifications, pharmacological interventions, and addressing psychosocial aspects.

Initial Assessment

- **Clinical Evaluation:** Assess for signs of hyperandrogenism (hirsutism, acne, alopecia), menstrual irregularities, and obesity.
- **Diagnostic Criteria:** Confirm diagnosis based on Rotterdam criteria - two of the following: oligo/anovulation, clinical/biochemical signs of hyperandrogenism, and polycystic ovaries on ultrasound.
- **Laboratory Tests:** Hormonal profile including LH, FSH, testosterone, DHEAS, 17-OHP, fasting glucose, insulin levels, and lipid profile.
- **Ultrasound:** Pelvic ultrasound to evaluate ovarian morphology.

Lifestyle Modifications

- **Weight Management:** Encourage weight loss through diet and exercise, especially if overweight or obese, as it can improve insulin resistance and menstrual regularity.
- **Dietary Changes:** Advocate a balanced diet rich in fruits, vegetables, whole grains, and lean proteins. Limit intake of processed foods and sugars.
- **Physical Activity:** Regular exercise, including both aerobic and resistance training, to improve insulin sensitivity and reduce cardiovascular risk.

Pharmacological Treatment

- **Oral Contraceptives:** First-line for menstrual irregularity and hyperandrogenism. Helps regulate menstrual cycles, reduce acne and hirsutism.
- **Metformin:** Used for insulin resistance, especially beneficial in overweight girls or those with impaired glucose tolerance.
- **Anti-Androgens:** Such as spironolactone, can be used for severe hirsutism and acne not responsive to oral contraceptives.
- **Menstrual Regulation:** Progestin therapy can be used for endometrial protection in girls who cannot take oral contraceptives.

Addressing Fertility

- **Fertility Counseling:** Discuss future fertility considerations and management options.
- **Ovulation Induction:** Clomiphene citrate or letrozole for anovulatory infertility when desired.

Management of Associated Comorbidities

- **Screening for Comorbidities:** Regular monitoring for metabolic syndrome, type 2 diabetes, dyslipidemia, and hypertension.
- **Mental Health Support:** Screen for and address mental health issues like depression and anxiety, which are more common in PCOS.

Psychosocial Management

- **Education and Counseling:** Provide information about PCOS, its implications, and treatment options.
- **Support Groups:** Encourage participation in support groups for emotional support and sharing experiences.

Long-term Monitoring

- **Regular Follow-up:** Monitor treatment efficacy, side effects, and the emergence of new symptoms or comorbidities.
- **Bone Health:** Monitor and manage bone health, particularly if amenorrhea persists.

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Q: Diagnosis and management of PCOS

Aspect of PCOS	Diagnosis	Management Strategies
Clinical Evaluation	History of menstrual irregularities Signs of hyperandrogenism (hirsutism, acne, alopecia)	Regular monitoring of menstrual cycle Assessment of symptoms and impact on quality of life
Diagnostic Criteria (Rotterdam Criteria)	At least two of the following: 1. Oligo or anovulation 2. Clinical and/or biochemical signs of hyperandrogenism 3. Polycystic ovaries on ultrasound	Tailored treatment based on predominant symptoms and patient's goals (e.g., fertility, symptom management)
Laboratory Tests	Hormonal profile (LH, FSH, testosterone, DHEAS, 17-OHP) Fasting glucose and insulin levels Lipid profile	Monitoring for associated metabolic conditions Lifestyle modifications for insulin resistance

Ultrasound	Polycystic ovaries: ≥ 12 follicles in each ovary measuring 2-9 mm in diameter and/or increased ovarian volume	Regular follow-ups to monitor ovarian morphology
Lifestyle Modifications	Not a diagnostic criterion but important for overall assessment	Weight management through diet and exercise Reduction of risk factors for type 2 diabetes and cardiovascular disease
Pharmacological Treatment	Not used for diagnosis but may be indicated based on symptoms	Combined oral contraceptives for menstrual regulation and hyperandrogenism Metformin for insulin resistance Clomiphene or letrozole for ovulation induction in infertility
Management of Associated Conditions	Assessment for comorbidities like type 2 diabetes, dyslipidemia, hypertension, and mental health issues	Targeted treatment for comorbid conditions Regular screening for metabolic syndrome components
Cosmetic Treatments	Assessment of the extent of hirsutism, acne, and alopecia	Topical treatments for acne Laser hair removal or electrolysis for hirsutism Minoxidil for alopecia
Psychological Support	Evaluation of mental health status, including anxiety, depression, and body image concerns	Counseling or therapy for mental health support Support groups and patient education
Long-term Monitoring	Regular follow-up for monitoring of symptoms and management effectiveness	Ongoing assessment of metabolic, reproductive, and psychological health Adjustments in management plan as needed